

Evaluation of Temperature Sensors as a Tool to Aid in Compaction of Superpave

The purpose of this study was to evaluate the affects mix temperature has on the compaction of Superpave asphalt.

Over the last few construction seasons, some contractors have had difficulty in obtaining sufficient density in Superpave asphalt mixes. A major issue called "tender zone" has surfaced in some Superpave asphalt mixes. A tender zone is described as a temperature range within the asphalt mix that will not allow sufficient compaction. By knowing the mix temperature as it is being rolled by the intermediate roller, and calculating the density at the same location, a multiple regression curve can be calculated and drawn which will show a tender zone. This same regression curve will also show a temperature range where the asphalt mix should be rolled to achieve sufficient compaction. For most Superpave asphalt mixes, the tender zone ranges somewhere between 200 degrees F to 240 degrees F. Within this range the asphalt mix will push, shove or tear and a roller could do more damage than good when rolling within the tender zone. Compaction is best achieved during temperatures that are lower or above the tender zone.

We tried the temperature sensors on three construction projects. One of the projects did not show a distinct tender zone but that may be due to lack of data or the intermediate roller (pneumatic) may have been sufficient to achieve compaction. The other two projects did show distinctive tender zones.

Production rates for many asphalt operations are geared towards production rate of the plant or how much the road operations can handle. However, better consistent asphalt compaction would be achieved if the roller speed would be matched to the proper mix temperatures of the asphalt.

It is our recommendation for asphalt contractors to be strongly encouraged to install and use temperature sensors on rollers to identify tender zones, and zones for which asphalt compaction can be best attained for super pave asphalt mixes.

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